

Results from the Multi-species Analysis of Discrete Air Samples Collected in the Denver-Julesburg Oil and Natural Gas Basin Between 2008 and 2014

G. Petron^{1,2}, B. Miller^{1,2}, I. Mielke-Maday^{1,2}, J. Kofler^{1,2}, S. Montzka², E.J. Dlugokencky², P. Lang², A.E. Andrews², C. Sweeney^{1,2}, E. Thorley^{1,2}, S. Schwietzke², B. Vaughn³, G. Frost⁴, S. Kim⁵, P.P. Tans², J.B. Miller^{1,2}, D. Helmig³, A. Karion^{1,2}, T. Newberger^{1,2}, S. Wolter^{1,2}, D. Guenther⁶, D. Kitzis^{1,2}, B.D. Hall², P. Novelli², S. Conley⁷, D. Wolfe^{1,8} and R.C. Schnell²

¹Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO 80309; 303-497-4890, E-mail: Gabrielle.Petron@noaa.gov

²NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO 80305

³Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO 80309

⁴NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, CO 80305

⁵Fairview High School, Boulder, CO 80305

⁶formerly at NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, Colorado 80305

⁷University of California at Davis, Davis, CA 95616

⁸NOAA Earth System Research Laboratory, Physical Sciences Division, Boulder, CO 80305

NOAA/GMD has been conducting long-term multiple species air analysis in the Colorado Northern Front Range from a few fixed locations at different elevations and from an instrumented vehicle for close to 7 years. The region presents a unique mix of urban, oil and natural gas and agricultural sources and their emissions are reflected in the gases measured in the discrete air samples analyzed at NOAA/GMD and the University of Colorado (CU) Institute of Arctic and Alpine Research (INSTAAR). In this presentation, we show results for the analysis of the composition of air sampled at 2 tower sites, Niwot Ridge and Boulder Atmospheric Observatory, and one aircraft profiling site near Carr, CO. We also compare those measurements with observations collected during intensive mobile ground-based (2008-2014) or airborne (2012 and 2014) field campaigns. Over this time period, population and oil and gas operations have both been growing in the region. Due to its ozone non-attainment status (2007 designation), the State has tightened requirements for precursors sources emission reduction in the region. What can these ambient air measurements tell us about if and how emissions are changing?



Figure 1. Jonathan Kofler with GMD Mobile Laboratory at the BAO site